APHERESIS PATIENT CARE

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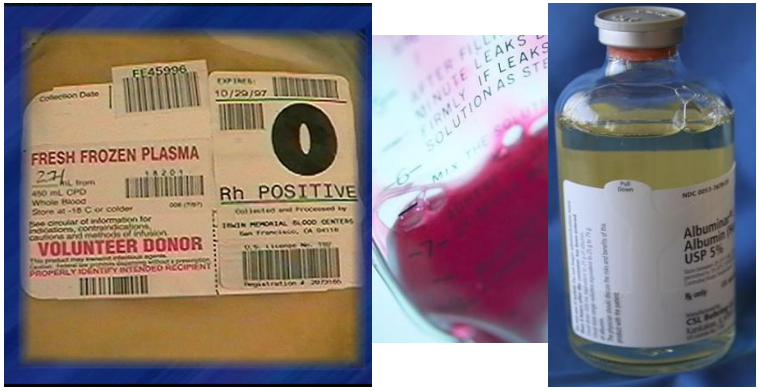
Patient Care Topics

- Adverse Reactions

- Fluid Replacement



- Assessment & Monitoring

Patient Care Topics

- Pharmacology

- Vascular Access

ADVERSE REACTIONS

Overall reaction rate: 2-17% of all procedures.[1]

4 most common reactions

- Citrate Toxicity
- Vasovagal Reactions
- Allergic Reactions
- Transfusion Reactions

Others include:

- Electrolyte Changes
- Hypo/Hypervolemia
- Altered Pharmokinetics
- Hematologic changes

[1] Simon T, et. al, Apheresis Principles and Practice, 1997: 77-78

Prevention of Adverse Reactions

Perform a thorough assessment of the patient including:

- Diagnosis and Medical History
- Medications
- Vital Signs and Labs
- Changes since last apheresis treatment

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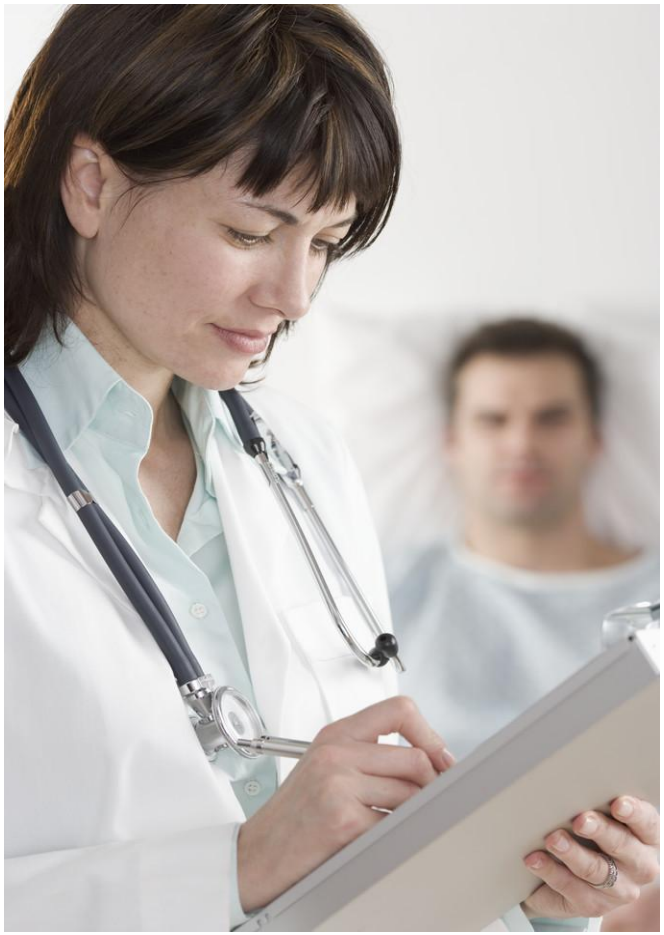
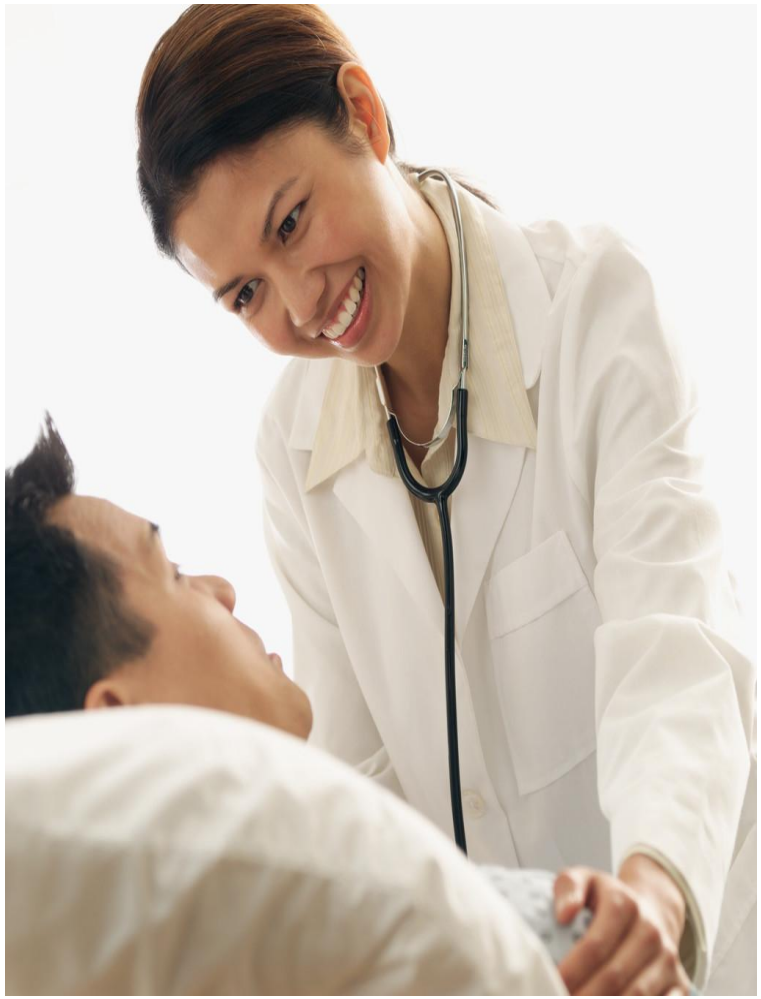


Prevention of Adverse Reactions

- Consider correcting imbalances before starting procedure
- Good communication with patient and staff is a key element
- Knowledge of signs, symptoms and treatment of adverse reactions will prevent a mild reaction from becoming serious



Early Signs and Symptoms of an Adverse Reaction [3]

Cold and clammy hands
Excessive talking
Irregular breathing patterns
Hyperventilation
Tachycardia
Flushed or pale face
Inappropriate laughter
Restlessness
Abdominal cramping

[3] Golden PJ, Principles of Apheresis Technology, 2002: 86

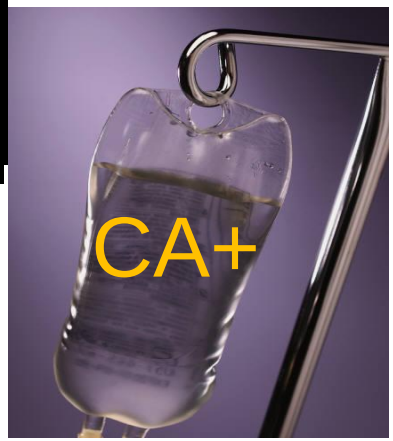
The Symptoms of Citrate Toxicity [4]

Mild	Moderate	Severe
Paresthesias	Lightheadedness	Tetany
- Perioral (Lips)	Muscle Cramps	Laryngeal Spasm
- Peripheral (Fingertips, legs)	Weakness	Seizures
Chills	Nausea	Arrhythmia
Shivering	Vomiting	Prolonged QT Interval
“Crawling Feeling”	Chest Pain	Bradycardia

4 Golden PJ., Principles of Apheresis Technology, 2002: 86-87

Treatment of Citrate Toxicity

- Mild:
  - **SLOW** the procedure (inlet rate) to decrease the citrate infusion rate
  - give calcium replacement p.o. or IV
  - cover with a warm blanket
  - reassure the patient but observe carefully



Treatment of Citrate Toxicity

- Moderate:

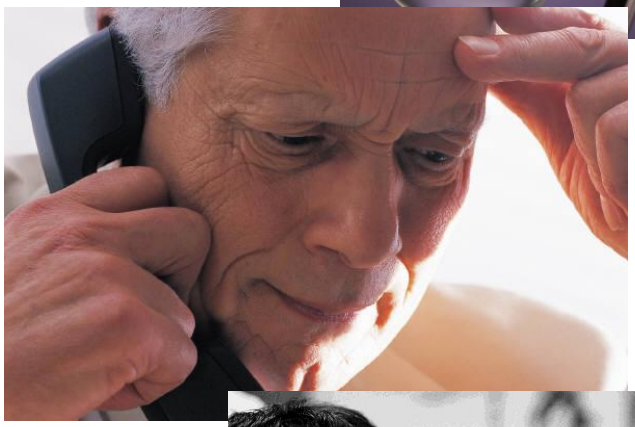
  STOP the inlet blood pump (pause tx)

  – begin or increase IV calcium infusion

  – consider risk-benefit of reinfusion

Treatment of Citrate Toxicity

- Severe:
  - **STOP** the procedure
  - Do not rinseback
  - Begin or continue IV calcium replacement
  - Notify MD and support team
  - Begin life support measures



VASO-VAGAL REACTIONS

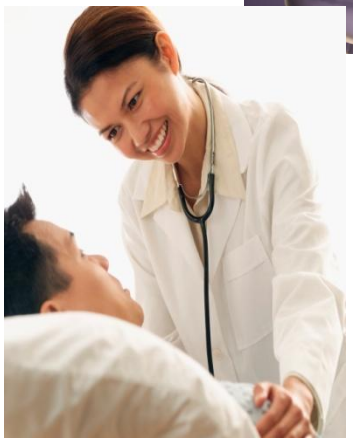
"Sudden fainting due to hypotension induced by the response of the nervous system to abrupt emotional stress, pain, or trauma." [5]

- **Symptoms**
  - Apprehension
  - Lightheadedness
  - Nausea
  - Decreased pulse rate
  - Hypotension
  - Perspiration
  - Can progress to cardiac arrest

[5] Clayton T ed. Taber's Cyclopedic Medical Dictionary, 1997: 2067.

VASO-VAGAL REACTIONS

- **Treatment**
  - Pause the procedure
  - Infuse fluids as ordered
  - Lower donor/patient's head
  - Communicate with the patient
  - Vital signs Q 2-3 minutes



ALLERGIC REACTIONS

- CULPRITS:
  - **<u>Blood products</u>**
  - Albumin
  - Iodine used in cleansing of skin
  - Latex
  - Ethylene oxide used in sterilization of the disposable sets
  - Plastic of the disposable set and replacement fluids

ALLERGIC REACTIONS

Symptoms

MILD	MODERATE	SEVERE
Itching	Intense itching	SOB
Urticaria (rash)	Widespread urticaria	Hypotension
Rhinitis	Hives or Welts	Diarrhea
Cough	Rhinitis	Laryngeal Edema
Tearing	Wheezing	Cardio-pulmonary Arrest
	Tongue or Facial Swelling	

ALLERGIC REACTIONS

Treatment

- **Mild:**
  - Determine cause
  - Consider IV Benadryl and/or Hydrocortisone (MD order)

- **Moderate:**
  - STOP the procedure
  - Maintain access for IV meds, i.e., Benadryl, Hydrocortisone, Epinephrine per MD

- **Severe:**
  - STOP the procedure, medicate as ordered, call for support.

Transfusion Related Reactions [6]

Acute Transfusion Reaction	Symptoms
Acute hemolytic	Fever, acute hypotension, disseminated intravascular coagulation (DIC)
Febrile non-hemolytic	Elevated temperature of ≥ 1° C, assoc with transfusion and without any explanation, chills, rigors
Transfusion-associated sepsis	Severe rigors, over 40° C, cardiovascular collapse
Urticaria (Hives)	Rash and/or hives, itching, frequently without fever
Transfusion-related acute lung injury (TRALI)	Acute respiratory insufficiency, chills, fever, cyanosis, hypotension
Circulatory overload	Dyspnea, cyanosis, orthopnea, severe headache, hypertension, congestive heart failure, neck vein distention

[6] Golden PJ., Principles of Apheresis Technology, 2002: 90-91

Transfusion Reactions

Prevention and Management

Prevention:

- Pre-medicate with acetaminophen, diphenhydramine, steroids as ordered.
- Use a blood warmer and blankets.
- Use 20-40 micron filters when transfusing plasma to remove micro-aggregates and reduce risk of post transfusion respiratory distress syndrome.
- Medicate mid-tx with diphenhydramine to prevent/reduce post-transfusion reactions.
- Assess patient frequently, q 15 min.

Management:

- Resolve severe chills or rigors with a small does of Demerol, 12-25 mg (IV). [7]

[7] Golden P J. Principles of Apheresis Technology, 2002: 90-91

FLUID REPLACEMENT

5 % Albumin

- No coagulation factors
- No infectious agents
- Given without regard to blood type
- Minimal preparation time, no pre-meds needed
- No added citrate BUT not bound to Ca ions
- Used when patient's religious preferences prevent using blood bank products

- **Combination of Albumin and 0.9% Normal Saline**

FLUID REPLACEMENT

- **Fresh Frozen Plasma (FFP)**
  - Higher risk of adverse reactions than Albumin
  - Use it when disease treated (TTP/HUS) impairs or depletes coagulation factors
  - Pre-medication is prudent
  - Advisable to use filters
  - Contains all coagulation factors
  - Contains citrate

- **Combination of Albumin and FFP**

FLUID REPLACEMENT

“Cryo-poor” or Cryoprecipitate-reduced plasma

- Cryoprecipitate has been removed – can be useful in refractory TTP
- Higher risk of adverse reactions than Albumin
- Same pre-meds and preparation as FFP
- Contains citrate

Red Blood Cells

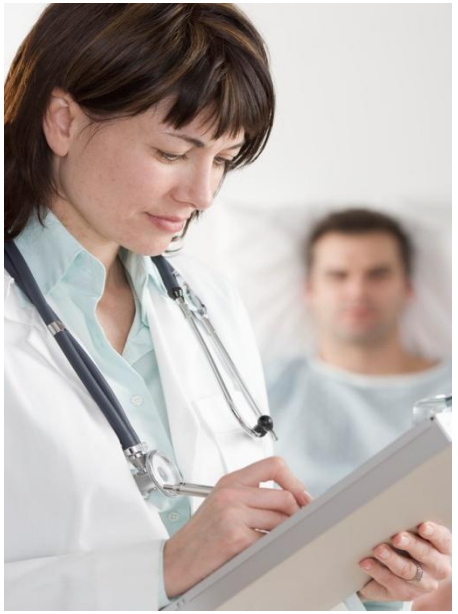
PRBC Type (<u>average</u> Hct, <u>average</u> volume)

- **PRBC's deglycerolized (75%, 180 ml)**
- **Washed (75%, 180 ml.)**
- **AS-1(Adenine Saline) (60%, 330 ml)**
- **Leukocyte reduced AS-1 (60%, 225 ml)**
- **Leukocyte reduced CPDA-1 (Citrate Phosphate Dextrose Adenine) (75%, 215 ml)**

ASSESSMENT & MONITORING

During any procedure whether donor or therapeutic, the operator must be ***VIGILANT!***

An initial assessment should include:



- review of pt's medical history
- current meds and labs
- Physical/psychological assessment
- Vital Sings
- appropriateness of treatment
- allergies to meds and environment
- questions patient and family have regarding treatment

ASSESSMENT & MONITORING

Intra-procedure Care and Monitoring:

- Constant checks of machinery and fluids
- Check lines for kinking
- Check air vents on IV spikes
- Check machine pumps
- Check fluid volumes in ACD, replacement and collect containers
- Check color of centrifuge fluids

Constant patient observations

- VS q 15 min
- Cardiac monitoring, if needed
- Observe for reactions

PHARMACOLOGY

3 Important Considerations

Route, time, and distribution of meds

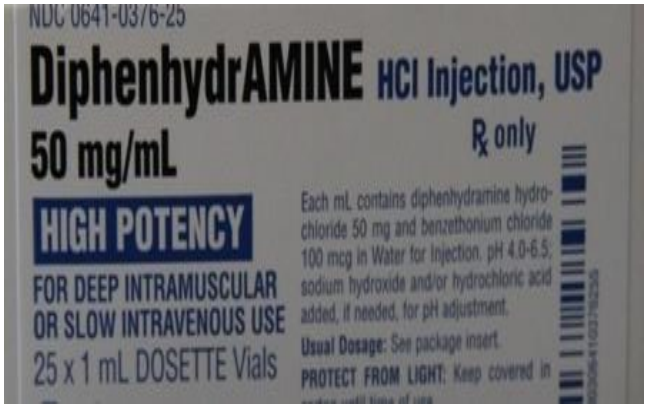
Medications for treatment of pt's disease(s) and complications

- ACE Inhibitors
- Corticosteroids
- Anticoagulants
- gCSF
- Antibiotics
- Anti-seizure meds
- Anti-hypertensives
- Mestinon
- Calcium Supplements
- Pain meds
- IV gtts
- Insulin

PHARMACOLOGY

Medications given <u>during</u> apheresis treatment:

- Citrate
- Tylenol
- Corticosteroids
- Heparin
- Benadryl
- Calcium Supplements



PHARMACOLOGY

Consequence of plasmapheresis on specific medications

"Medications that are free in the plasma and not bound to plasma protein **<u>are not</u>** efficiently removed during plasma exchange" [8].

- Also medications that are fixed in the tissues are not easily removed.

- "Those medications that are highly bound to plasma protein and are slowly metabolized **<u>are readily removed".</u>** [9]
  - Bronchodilators and some anti-seizure medications are in this category.

[8] [9] Clough LF. Principles of Apheresis Technology, 2002: 65.

Vascular Access

Central Veins

- Jugular
- Subclavian
- Femoral

Use dialysis catheters

- Dialysis double lumen catheters:
  - Staggered ports to prevent recirculation
  - Large bore lumens to provide flow rates of up to 400 ml/min
  - Readily available
- Firmness to prevent collapse during high flow rates
- Biocompatibility and infection resistant

Vascular Access

AV-Fistula or Graft

- Arterial pressures – keep access and return lines clamped until ready to start procedure.
- Adequate pressure after needle removal post treatment
- Place access needle distal to return needle to prevent recirculation
- Rotate venipuncture sites
- Ask dialysis for assistance if unfamiliar

Vascular Access

- Ports
  - Useful with chronic patients
  - Advantages:
    - Reduced risk of infection
    - Reduced lifestyle limitations
  - Disadvantages:
    - May need de-clotting prior to use

Peripheral Vascular Access

- Inlet or draw side
  - 16-to17 gauge steel needle
  - Need blood flow rate at least 40-50 ml/min
  - Use needle with a back eye
- Return side

  -May use lower arm or hand veins

  - I.V. catheters

  - 17 or 18 gauge

Advantage over catheters: Reduced risk of infection, hemorrhage & thrombosis

Complications of Access

- Infection
- Occlusion: Mechanical or thrombotic
- Mechanical displacement
- Bleeding
- Air embolus
- Pneumo- or hemo-thorax [10]

[10] Clough LF. Principles of Apheresis Technology, 2002: 80-84

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